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GLAUCOMA MALIGNUM,

WITH AN

ILLUSTRATIVE CASE.

BY

GEORGE REULING, M. D.,

SURGEON IN CHARGE OF THE MARYLAND EYE AND EAR INSTITUTE, BALTIMORE.

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GLAUCOMA MALIGNUM, WITH AN ILLUSTRATIVE CASE.

Glaucoma is a typical form of eye disease, which owes its origin to an increase in the intra-ocular fluids, and which, in the majority of cases, is accompanied by inflammation. It is not my intention to expatiate upon the causes of the increased tension, nor to explain the relationship existing between the inflammation and the intra-ocular pressure. Inasmuch, indeed, as there may be great tension and no inflammatory symptoms (*glaucoma simplex*), this connection is, as is known, the subject of several theories, each of which may be, in a measure, correct, since there is no doubt that very different causes may lead to increased tension and glaucoma.

The disease may be divided into two great groups, to particularize which division it will be necessary to make a few explanatory remarks. It can be proved by direct injection, as Leber has shown, that there exists no immediate connection between the anterior chamber and the vitreous humor; hence the idea of interchange of liquids by endosmosis and exosmosis has become an exploded theory. This being the case, Stilling was led to conjecture the existence of a defluent canal, the office of which must be to carry off the superabundant, and to refurnish the deficient, fluid circulating in the vitreous body. This canal, whose office, therefore, is to establish a normal equilibrium, he very naturally asserted to be the central tubu-

lar canal of the vitreous body. In order to prove the truth of his theory, he made a number of interesting experiments. He, for instance, applied a tight ligature around the optic nerve of a rabbit, carefully protecting the surrounding parts from injury, in order to avoid neuro-paralysis. Five to ten days after the application of the pressure, very marked increase of tension was produced. The cornea became entirely bereft of sensation, the eye became stony hard, and the vitreous body, especially its posterior portion, became fluid. The reason for these appearances was manifest. If the optic nerve is firmly compressed, the interchange of fluid from the Pialsheath of the optic nerve on the one hand, and the central tubular canal on the other, is interfered with. This canal, therefore (that is, the central tubular and the Pialsheath), may be called the posterior drainage or defluent canal; and if closed, by whatever means (as shown by Stilling's experiment), the intra-ocular pressure is increased, and excavation of the optic nerve results.

There is, however, another drainage canal, the anterior, or, in other words, the Fontanaic space. If this is closed, as when there is total pupillary occlusion, or when the iris is adherent to the posterior surface of the cornea, a form of glaucoma is produced, the origin of which may be explained by the fact that, as pressure in the anterior chamber increases, not as much fluid can be carried off by the posterior defluent canal in a given time as takes place normally, and that therefore glaucoma (excavation of the optic nerve) results.

There are, therefore, two main divisions of the disease:

1. When the posterior drainage or defluent canal is interfered with or closed by some pathological condition: this form may be designated, at the recommendation of Stilling, as *glaucoma posticum.*

2. Where the anterior defluent canal, the Fontanaic space, is closed (as in *glaucoma consecutivum*, after, for instance, iritis serosa, ulcera corneæ, and so on), whereby, as above stated, not sufficient fluid can pass from the vitreous into the Pialsheath in a given time, in order to maintain a healthy balance: this may be called *glaucoma anticum.*

It must be here stated, however, that mere closure of the Fontanaic space itself does not *always* produce glaucoma, al-

though, in the great majority of cases, a firm adhesion of the periphery of the iris to the cornea (owing either, primarily, to the increased pressure or to an inflamed state of the surroundings of the canal of Schlemm, and consequent exudation from the iris and the vicinity of this canal) is to be met with in the glaucomatous process, and, as above shown, may be either the cause (as in *glaucoma anticum*) or the result (in consequence of the pressure in the posterior part of the eye) of the disease.

As there may be complete closure of the Fontanaic space, with no existing nor necessary consequent glaucoma, so there may be entire patency of this space in even the most manifest glaucoma. In the great majority of cases, however, when obliteration of this space exists, it is due to increased tension or inflammatory exudation, depending indeed upon, or at all events leading to, the disease under consideration (Knies).

With the various subdivisions, *Glaucoma inflammatorium acutum*, *G. inflammatorium chronicum*, *G. simplex*, *G. consecutivum*, I will not engage the time of the reader, but would direct his attention to that very peculiar and, happily, very rare form of the disease known as *glaucoma malignum*.

The disease—of which I will present one case in illustration—occurs chiefly in women in the beginning of or during the climacteric years (Schweigger), or in those suffering with uterine troubles (Manz). (Hoffman's " Bijdrage tot de Kennis van het glaucoma." Utrecht, 1861.)

The patients *generally* present themselves with all the symptoms of a typical *glaucoma simplex consummatum* in the one eye, while the other, also affected with *glaucoma simplex*, is still, comparatively speaking, only slightly impaired as regards vision (Samelsohn, H. Pagenstecher, Schweigger: Ophthalmological Congress at Heidelberg, 1877). However, the one eye may offer to view, instead of *glaucoma simplex consummatum*, a *glaucoma inflammatorium chronicum absolutum* (Arlt), whereas the less affected eye may reveal the picture of a *glaucoma simplex*, i. e., increased tension and excavation of the optic nerve, but scarcely a trace of inflammation.

After the iridectomy, however—although this be performed in the most skillful and correct manner—pain sets in, the eye reddens, the lens is squeezed into the pupillary area, the eye is

even harder than prior to the operation, or, in other words, an acute inflammatory glaucoma develops, which, after the lapse of a few days, leads to total blindness (Schweigger, Ophthalmological Congress at Heidelberg, 1877).

The question naturally presents itself: How is this much-to-be-dreaded event—which cannot be prevented or remedied—produced? In spite of the iridectomy, however well timed and well performed, the posterior defluent canal (the Pial-sheath of the nerve, or the tubular central canal of the vitreous) may continue obstructed, or the anterior defluent canal (the Fontanaic space) may in part remain closed; or the sclerotic may be so rigid that, even in spite of the incision, the pressure on the nerve continues: whatever the cause, it is certain that the intra-ocular tension, instead of being diminished and reduced to the normal condition, is increased by an acute glaucoma manifesting itself very suddenly; this increased pressure, however, forces the lens forward (Schweigger, *op. cit.*, l. i.), and, it may be, as in two cases described by Pagenstecher, and as in the one immediately to be detailed, even between the gaping margins of the wound. The lens will thus act as an irritant, producing an inflammatory condition of the iris and the ciliary body, and also shutting up the new defluent canal created by the iridectomy. That a cataractous condition of the lens may be produced by this protrusion is evident, although this fact alone would not present matter for serious reflection if, upon removing the lens, vision might be restored, even in part. This is, unhappily, not the case; relief from pain may indeed be given by extracting this local irritant (Hirschberg), although such extraction should not be undertaken immediately, for fear of resulting intra-ocular hæmorrhage (Arlt).

At the last meeting of the Ophthalmological Congress at Heidelberg (1877), my friend, H. Pagenstecher, of Wiesbaden, described three cases of *glaucoma malignum*, in two of which the lens had been pushed forward and protruded from the lips of the wound. In two cases also *both* eyes were operated on in one sitting.

Schweigger described six cases, all occurring in women at the climacteric period. Hirschberg mentioned a case which

happened in a diabetic patient, and Samelsohn narrated a perfectly similar case to those above treated of, i. e., where, after iridectomy had been performed for *glaucoma simplex*, *malignant glaucoma* supervened, ending, of course, in total loss of sight.

The case I will now describe presented to view all the characteristics of the disease treated of in the above. It is very interesting, inasmuch as it serves to enrich ophthalmological literature with a rare instance of true *glaucoma malignum*, and a detailed account will therefore be given.

The *status præsens* of the case, when she presented herself at the Institute, July 6, 1875, was as follows:

Mrs. R., of slender build and in feeble health; about forty-five years of age.

Left eye: Visual power equal zero. The media, including the crystalline lens, cloudy; so much so that the fundus cannot be seen. Tension extreme (T. 3, of Bowman's classification: the ball cannot be dimpled, even by firm pressure). Sclerotic white and glistening—owing to atrophy of the subconjunctival tissue. Extremely shallow anterior chamber; iris atrophic; cornea flattened and bereft of sensation. She has had repeated exacerbations of frontal pain, which have increased in intensity of late, and are now—at the time of her admission into the Institute—very severe.

Right eye: Tension somewhat increased (T. 1, Bowman); pupil slightly dilated and slow to react. Field of vision contracted toward nasal side. Media clear; vision not greatly reduced (about one-third); there is, however, well-defined excavation of the optic disk, extending to the inner margin. No spontaneous, but easily producible, arterial pulsation. Presbyopia rapidly increasing. No ciliary neuralgia.

The diagnosis was *glaucoma inflammatorium chronicum consummatum* in the left, and *glaucoma simplex* in the right eye.

The prognosis as to vision in the left eye was, of course, *nil*. An iridectomy was, however, proposed for this eye, in order, simply, to alleviate the pain and to arrest the inflammatory exacerbations. The prognosis regarding the right eye was, of course, decidedly more favorable, the great probability

being that the process would be checked, and sufficiently useful vision retained in this eye after the operation. A broad upward iridectomy was accordingly performed in both eyes. The immediate result of the operation was most satisfactory. A clear and large pupil was obtained, unattended with any bleeding into the anterior chamber, and the tension in the right eye had diminished immediately subsequent to the iridectomy, so that the finger could easily impress it.

The patient was visited by me and my assistant several times during the day, as well as in the evening. Her condition was found to be very good. That night, however (it is worthy of remark that these cases of malignant glaucoma—that is, acute inflammatory ensuing upon chronic inflammatory or simple glaucoma—always show themselves during the first night after the operation. V. Schweigger, *op. cit.*, p. 22), she had had an attack of angina pectoris, to which she was subject, and, the nurse informed me, had sat up in bed in her attempt to get breath. She had suffered intense pain in and around the eyes during the night.

On carefully removing the bandage, I discovered that both eyes were extremely congested, the lips of the incisions gaping and the upper margin of each lens protruding, having been squeezed between the wounds.

Owing, perhaps, to the effort of sitting up in bed, or, simply and alone, to that unaccountable tendency to increased pressure and inflammatory appearances which, luckily, manifests itself in but comparatively few eyes, an acute glaucoma had taken the place of the simple glaucoma in the right, and a renewed inflammatory exacerbation had followed upon the consummated disease in the left eye; the crystalline lenses were pushed forward into the lips of the wounds by the increased pressure, joined to the exertion of the patient, and that unfortunate condition known as *glaucoma malignum* was produced.

Oblique illumination revealed to me, when the bandage was first removed, a small opacity in the right lens, spreading from the point of pressure (the lips of the wound) toward its centre. The left lens, as has been said, had been murky be-

fore the operation, having participated in the general degeneration of the different tissues of this eye.

I did not deem it advisable to extract the lenses, dreading hæmorrhage, and preferring to replace them by means of the recumbent position and the pressure-bandage.

After the lapse of about fourteen days both wounds were firmly closed, and I proposed the operation of extraction of the right lens to the patient and her relatives, to be performed in a few weeks. This I was not permitted to do, the husband objecting, nor did I insist, as I was aware that no useful vision would have resulted after so manifest a case of malignant glaucoma.

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